PROGRAMMABLE WATER HEATER

This is a formalization of U.S. Provisional Patent Application Serial No. 60/409,214 filed September 9, 2002.

Field of the Invention

The present invention relates to water heaters, and more particularly, an apparatus for programmably controlling a water heater to provide more efficient use thereof.

Background of the Invention

Typically, hot water heaters heat water through the use of either electricity or natural gas. The hot water heater provides a thermostat wherein the temperature of the water within the hot water heater is maintained at a predetermined temperature established by the thermostat. When the water within the hot water heater reaches a temperature below the predetermined temperature set by the thermostat, the hot water heater begins to heat the water within the hot water heater until the water reaches the predetermined set temperature.

The reheating of the water within the hot water heater is inherently an inefficient process because the water within the hot water heater is maintained at a predetermined temperature even when the water within the hot water heater is not ready to be used. This situation has continued in the industry because most consumers do not know at what point they will or will not need hot water. In addition, consumers are typically not willing to wait the necessary length of time for a hot water heater to heat a full tank of cold water. Thus, many consumers are willing to live with the inefficient process of a hot water heater in order

to have hot water on demand.

However, there are times in which a consumer does know in advance that they will not need hot water. For instance, vacations, work schedules, nighttime and other events allow consumers to know that they will not be needing hot water during those time periods. Therefore, it would be a more efficient process if the hot water heater was turned off during those periods in which hot water was not required.

It would be desirable to provide a programmable hot water heater that would allow for the turning on and off of a water heater based on a consumer's demand schedule.

Summary of the Invention

The present invention solves the above-noted shortcomings by providing an apparatus for programmably controlling the operation of a water heater. The apparatus of the present invention provides a programmable timer coupled to a water heater for establishing predetermined times of when the water heater should be engaged and disengaged. The present invention also provides a means, coupled to the water heater, for disengaging and engaging the water heater in response to the programmable controller. In addition, the apparatus of the present invention provides a means for powering the programmable timer and the disengaging means in order to properly operate the apparatus of the present invention.

Brief Description of the Drawings

The description herein makes reference to the accompanying drawings, wherein like

reference numerals refer to like parts throughout several views and wherein:

Fig. 1 is an exploded view showing the apparatus of the present invention being utilized on a standing pilot gas water heater;

Fig. 2 is a perspective view further showing the present invention used on a standing pilot gas water heater; and

Fig. 3 is a schematic diagram showing the present invention utilized on a power vented gas water heater.

Detailed Description of the Present Invention

Referring to the drawings, the present invention will now be described in detail with reference to the preferred embodiment.

Figs. 1-3 depict an apparatus **10** for programmably controlling the operation of a water heater **12**, as shown in the present invention. The apparatus **10** provides a programmable timer **14** which actuates a means for disengaging **16** the water heater **12** in response to the programmable timer **14**. The programmable timer **14** may be mounted on the water heater **12** directly or it may be mounted on a wall of the home or building in which the water heater is housed. The present invention also provides a means for powering **18** the programmable timer **14** and the disengaging means **16** in order to programmably control the apparatus **10**.

The apparatus **10** of the present invention may be utilized on any type of conventional water heater **12**. Figs. 1 and 2 show a gas water heater **12** having a standing pilot. The water heater **12** provides a tank **20** having a primary anode rod **22**, a dip tube **24**, and a flue baffle

26 which are all located within the tank **20**. The water heater **12** also provides a draft hood **28** at the top of the tank **20** and a temperature-pressure relief valve **30** in the side of the tank **20**. A drain valve **32** is provided in the side of the tank **20** in order to drain the water from the tank **20** if necessary.

In order to heat the water within the water heater **12**, natural gas is burned by the water heater **12**. A gas control valve **34** controls the flow of natural gas to the water heater **12**, and a temperature adjustment knob **36** maintains the water within the water heater **12** at a predetermined temperature. An upper manifold **38** extends from the gas control valve **34** to a solenoid **40**. A lower manifold **42** is connected to the solenoid **40** and communicates with a burner **44**. The upper and lower manifolds **38, 42** direct natural gas to the burner **44** so that the burner **44** may burn the natural gas and heat the water within the water tank **12**. The solenoid **40** actuates a valve (not shown) allowing the natural gas to flow from the upper manifold **38** to the and lower manifold **42**. A pilot tube **46** is also connected to and extends from the gas control valve **34** and provides a small stream of natural gas to a pilot **48**. A burning element **50** is provided adjacent the pilot **48** such that the pilot **48** burns the burning element **50**, thereby maintaining the flame on the pilot **48.**

As seen in Fig. 2, the programmable timer **14** of the present invention may be programmed by entering the days and times in which the user wishes to engage and disengage the hot water heater **12.** The programmable controller **14** is electrically connected to the solenoid **40**, and a thermopile **54** acts as a millivolt generator to provide power to the circuitry of the programmable controller **14**. The thermopile **54** allows the apparatus **10** to operate without the need of an external power source. This is advantageous with the water

heater **12** disclosed in Figs. 1 and 2 since a gas hot water heater with a standing pilot does not typically have electrical power leading to or from the water heater **12**. In addition, the thermopile **54** works as a safety device because if the pilot **48** is extinguished, the thermopile **54** does not generate power thereby automatically disengaging the solenoid **40**. With the solenoid **40** disengaged, natural gas cannot be fed to the burner **44**.

The present invention may also be utilized with a power vented gas water heater **12,** as seen in Fig. 3, or the present invention may be utilized with electrical water heaters (not shown). The main difference with the apparatus **10** when used on power vented gas water heaters and electrical water heaters is that such water heaters **12** have power leading to the water heaters **12** for the operation thereof. Therefore, instead of using thermopile **54**, the present invention simply uses the power provided to the water heater **12**. The circuitry of the power vented gas water heater **12** is connected to a 110/120 volt power supply **56** with the water heater **12** being securely and adequately grounded by ground **57**. An on/off toggle switch **60** is provided on a control box **62** below the gas control valve **34** to allow the circuit to operate the water heater **12**. The power vented gas water heater **12** provides a similar tank **20** (not shown in Fig. 3) and burner assembly as shown in Figs. 1 and 2. As seen in Fig. 3, the gas control valve **34** has the temperature adjustment knob **36** on the control box **62**. The gas control valve **34** also has an on/off switch whereby the gas control valve **34** must be in the "on" position to allow gas to flow through the gas control valve **34**. The upper manifold **38** extends from the gas control valve **34** and is connected to the solenoid **40**. The lower manifold **42** extends from the solenoid **40** and communicates natural gas to the burner **44**. The pilot tube **46** extends from the gas control valve **34** and communicates natural gas to the

pilot **48** wherein a stream of natural gas is lit to maintain a flame from the pilot **48.**

The power vented gas water heater **12** also provides a gas pressure switch **64** and a gas pressure meter **65** to monitor an initial flow of natural gas provided by the water heater **12** when the thermostat calls for heat. When the gas pressure switch **64** senses natural gas, it closes an electrical circuit provided to the blower **66**. The blower **66** provides pressurized air through an air line **68** which communicates with an air pressure switch **70**. An indicator light **72** is actuated upon the actuation of the blower **66**. When the blower **66** has provided sufficient venting, the air pressure switch **70** closes, and the indicator light **72** turns off. When sufficient venting occurs, the air pressure switch **70** closes a circuit through a venting manual reset switch **74** and the gas control valve **34**. The gas control valve **34** opens and allows gas to flow to the burner **44**.

The programmable timer **14** overrides the circuitry in the power vented water heater **12** to disengage and engage the water heater **12** at predetermined intervals. The programmable controller **14** is electrically connected to a 24 volt contactor **78** which is connected to the 110/120 volt power supply **56**. A 24 volt transformer **80** is connected to the contactor **78** to provide power to the coil of the contactor **78**. The contactor **78** and the transformer **80** are properly ground by ground **57**. The contactor **78** provides a switch wherein power is allowed to flow to the circuitry of the power vented hot water heater **12** when the switch is closed, and power is not allowed to flow to the circuitry of the power vented hot water **12** when the switch is open, thereby disengaging and disabling the power vented hot water **12.** The programmable timer **14** may be programed by entering the days and the times in which a user desires to have the hot water heater **12** on and off.

In operation, an operator programs the programmable timer **76** to turn off or disengage the hot water heater **12** during predetermined intervals. When the programmable controller **76** disengages the hot water heater **12** in response to its program, the programmable timer **76** opens the circuitry of the water heater **12** to prevent the operation of the water heater **12.** When the programmable timer **76** engages or turns on the hot water heater **12**, the programmable timer **76** closes the circuitry of the hot water heater **12** thereby allowing the water heater **12** to function in a normal manner.

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, it is intended to cover various modifications and equivalent arrangements, included within the spirit and scope of the appended claims, the scope is to be accorded the broadest interpretations so as to account for all such modifications and equivalent structures as is permitted under the law.